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CONTENTS

	Page
A Rediscovered Succulent <i>By P. R. O. Bally</i>	1
Treatment of Game Trophies in the Field <i>By Paul Zimmermann</i>	3
Bird Notes from Molo, Part 2. The Garden <i>By Mrs. D. M. Sheppard</i>	6
Additions to the Checklist of Tanganyika Mammals <i>By G. H. Swynnerton and R. W. Hayman</i>	9
The Ratel <i>By J. D. L. Fleetwood</i>	11
The Rhino and the Lions <i>By W. M. Taberer</i>	13
Nature Notes	14
Activities of the Society in Nairobi <i>By Priscilla M. Allen</i>	18
Book Review Flora of Tropical East Africa. Orobanchaceae <i>By Dr. P. J. Greenway</i>	19



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A REDISCOVERED SUCCULENT

By P.R.O. BALLY, *Botanist, Coryndon Museum, Nairobi*

The genus *Monadenium* is small and confined almost entirely to tropical Africa. Only about 50 species are known. It is of particular interest to science by reason of its quite remarkable versatility in growth-forms, which range from dwarf, stemless herbaceous plants to spiny succulents and stout, fleshy trees up to 18 ft. high, while at the same time rigidly maintaining its very characteristic and uniform floral structure.

A thorough knowledge of all the species and of their distribution is likely to contribute substantially to our knowledge of the past history of tropical African vegetation.

In recent years many new species have been described and although it is certain that yet more remain to be discovered, our present knowledge is sufficient to give a fairly accurate picture of the evolution of the genus.

The very first species of this interesting genus was found by the explorer G. Fischer in 1885. It was described as *Monadenium coccineum* in 1895 by F. Pax in Engl. Jahrb. XIX, 126. The original plant however perished, together with the bulk of the Berlin Museum, in World War II. Neither the description nor a rather formal illustration of the fragment of a cyme give a satisfactory idea of what the plant is like. Fischer gave neither the locality nor the date of collecting of his specimen, but by computation with other and better annotated plants of his collection it became clear that the locality must be sought some 50 to 60 miles south or south-west of the Speke Gulf, in the region which extends between Lake Victoria and Lake Eyassi.

In March 1937, Mrs. J. Fosbroke, a keen botanist, whose husband was stationed in the Mbulu District, collected an immature plant of a similar *Monadenium* along a cattle track which runs from Endulen in Masailand down to the shores of Lake Eyassi. The plant was, however, not sufficiently mature to allow of comparison with Fischer's plant.



Monadenium Coccineum Pax

1. Drawing from a living plant collected near Endulen, Tanganyika
2. F. Pax's schematized drawing of the inflorescence, from Fischer's type
3. F. Pax's floral diagram of the Genus *Monadenium*

It is most frustrating when the genotype of such an interesting genus remains imperfectly known and the present writer, who was just completing a monograph on the subject, decided to make a special trip to the area in question.

The month of July being the probable date when Fischer collected his plant, it was the obvious choice for the trip. Should the plant be found, it would be at approximately the same stage of development as Fischer's specimen and therefore most suitable for comparison with Pax's description.

Arriving from Oldeani via Ngorongoro Crater, the first locality to be reached was Mrs. Fosbroke's. In the company of Mr. K. Rohde from Oldeani, the writer proceeded by lorry to Endulen, which afforded an excellent camp site near a small river. From there an overgrown track could be followed for a short distance, after which the car had to be left in the thornbush.

After two hours' walk in the direction of the escarpment the ground became rocky and began to drop. It was here that the first plants were encountered, growing in the shelter of bushes; a little further on they were quite common. As anticipated, the plants were precisely at the stage of development of Fischer's type plant, i.e. with their bright scarlet inflorescence fully developed, but leafless. It was thus possible to establish beyond doubt their identity with *Monadenium coccineum*.

The short foot-trek very nearly sealed the fate of the car. It was the season of bushfires, one of which had started up nearby during our absence and the wind carried it rapidly towards the vehicle. Fortunately the writer saw the smoke rolling across the plain from some distance, but it was only by covering the last mile at a run that he was able to drive it to safety out of the danger zone.

Some of the local Masai who were shown our plants subsequently confirmed that they knew them from further west, in Ussukuma, not so very many miles away, in the very region through which Fischer's route ran.

Ample herbarium-material, as well as living plants, were collected: the latter were planted in Nairobi, where they are growing well and have already flowered.

TREATMENT OF GAME TROPHIES IN THE FIELD

By PAUL ZIMMERMANN, *Sculptor—Taxidermist*

A. GENERAL TECHNIQUE

1. MAMMALS

Skinning: This must be done immediately after the kill. (Skins to be made into rugs should be cut symmetrically, care being taken to divide the light-coloured areas into equal halves). First a lead is cut along the middle of the belly, from sternum to anus, then other leads are cut along the inner side of each leg, from the foot towards the bellyline. For carnivora, this lead starts at the centre of each pad.

Salting: The skin must be salted on the spot and without delay. The amount of salt required varies with the size of the skin, e.g. a large lion skin requires about 10 lb. of dairy salt. Very coarse salt is useless as it does not draw moisture quickly enough. It should be crushed with a suitable implement, e.g. a heavy bottle or stone.

The salt is rubbed thoroughly into the fleshy side of the skin. If the flesh cannot be removed completely in the first instance the skin must be salted just the same and rolled up into a bundle, fleshy salted sides together, and set aside until the job can be finished—not later than within the next 24 hours. It is most important that all fat be removed, because skin covered by fatty tissue will deteriorate in less than 24 hours, even though treated with salt. Contact of the rolled up skin with a cement floor must be prevented by placing it on boards or something similar.

Drying: After the skin has been set aside for about 24 hours it is spread out in the shade, either on the ground or over a line, pole or branch placed horizontally, *salted side up*. A number of short sticks should be placed transversely between the folds to prevent the hairy sides from touching as they would if hung over a line. When the salted skin is spread on the ground it is not necessary to peg it down while it is drying. As soon as the skin is nearly dry, it is folded with *hairy surfaces* together to the required size and again exposed to the air for final drying.

Special note for zebra skins: Zebra skins, like the skins of giraffe or carnivora, are most perishable. The slightest delay in skinning and salting becomes a hazard. Decomposition may set in immediately and cause subsequent 'slipping of hair'. For this reason the above instructions should be followed implicitly.

Preservation of the mane: The fatty tissue covering the root of the mane must be carefully removed before salting.

Once the skin is dried and set in the bundle it is important not to force it open. If, however, it is absolutely necessary to inspect the skin, the folds must be opened only very little as otherwise the epidermis will crack and damage the skin permanently.

2. REPTILES

Pythons and other snakes are skinned either by cutting open along the belly before removing the skin or by stripping the skin from the neck downward (and inside out) before cutting open along the bellyline. The skin is then salted well and after a few hours the muscles adhering to the bellyskin can be scraped off more easily.

Crocodiles can be skinned in two different ways. If the bellyskin is wanted, it is cut off between the first and second lateral ridges. For 'horn-back' skins, the skin is simply cut open along the bellyline.

Monitor Lizards may be opened either along the centre back or centre belly, depending upon preference for either light or dark pattern.

Note: All reptile skins must be well salted prior to tanning. Best results are obtained with skins received in the fresh salted state (see note below on dispatch of skins). A well salted skin rolled up in a gunny bag will be safe from deterioration for about six weeks, depending on climate and general conditions. After that time it should be delivered for tanning or be allowed to dry. It is well to remember that a reptile skin to be preserved should never be exposed to the sun, but should be dried in the shade.

B. SPECIAL TECHNIQUES

1. HEAD MOUNTS

When skinning heads for head-shoulder mounts it is important to remember that the neckskin must be slit at the top or dorsal side and never at the throat. The lead to be cut starts close behind the horns or ears and continues towards the middle of the shoulders. From there the lead proceeds towards each elbow ending about three inches below, at which point another cut is made around the leg. The skin is cut off across the chest at a distance of about six inches or more below the start of the brisket or sternum.

The following hints are well worth noting, for if they should be neglected the unsightly 'slipping of hair' is a foregone conclusion. A dressed skin with slipped hair is quite useless for mounting.

Skinning of facemask and ears: After the headskin has been removed from the skull, the fleshy lipskin is carefully skinned from the hairy outer skin without cutting through the edge. The layer of flesh at the root of whiskers (carnivora) must not be removed in the process, but a series of superficial cross-cuts made carefully between the roots so as to permit the salt to penetrate the epidermis from below.

The nose cartilage must remain attached to the bare end of the nose, but must be separated carefully from the hairy skin which itself must not be cut away.

The mucous lining of the *eyelid* must be separated from the outer skin by a careful slit from the inside, without cutting through the edge.

The *ears* have to be skinned by starting at the base and dissecting the outer skin from the ear cartilage up to a distance of $\frac{1}{8}$ inch from the edge. If this is done correctly, the ear will look like a pocket turned inside out.

2. SKULLS

The skulls of carnivora (lion, leopard, etc.) wanted for mounting with teeth exposed, 'snarling', must not be boiled, as this treatment invariably causes the canines to crack or split during the subsequent life of the trophy. It is quite sufficient to remove the brain and flesh as far as possible and to apply salt thoroughly to all surfaces exposed before setting out to dry in the shade.

This precaution applies also to all skulls wanted for bleaching. Boiling will cause the bones to become permanently stained. Sometimes such stains may be removed but only at great expense of time, effort and money.

3. FEET

After the leg bone has been removed the toe bone must be dissected up to the end phalange which supports the nails or hoof. Every scrap of fat, flesh and gristle must be cut away so that the salt may penetrate the skin from underneath. Rub the salt well into the skin, well down into the nails (or hoof), then press the skin towards the sole and place the foot in the shade for drying.

In no circumstances should the legskin be slit at the back so as to facilitate the removal of the bone when the foot is to be used for mounting. The job of dissecting away the bone while the skin is gradually pulled down is time-consuming and also difficult. It is worth the trouble, as the seam on the finished mount always remains visible and unsightly. This hint applies particularly to elephant, rhino, buffalo and zebra feet or feet with short hair or no hair at all.

Carnivora: For skinning paws of carnivora, slit each toe underneath and rub the salt into the fleshy parts so that the claws may be preserved in situ.

Caution: It is not absolutely necessary to skin facemasks or feet by lamplight when the animal was shot just before sunset. The job may safely be postponed till the next morning, provided the unskinned parts are well covered with a cloth soaked in 95 per cent alcohol or methylated spirits.

The common practice of filling the footskin of elephant, or any other animal, with wood ash should be avoided. The ash merely prevents the evaporation of moisture, thus encouraging putrefaction and producing feet that are useless for mounting.

C. GENERAL INFORMATION

Storage: If salted trophies must be stored for some time, it is advisable to apply an insecticide for greater safety. Naphthalene, DDT or Gammexane in powder form are useful. If sprays are found to be more convenient, only water solutions should be used, as solvents ordinarily used in insecticidal sprays may prove harmful to the skins.

Dispatch of skins: All animal skins, except reptile skins, can be dispatched for processing after they have been salted and dried as indicated above. Crocodile skins, however, should be dispatched in a fairly fresh state, salted but not dried, packed in a gunny bag marked 'perishable goods' for speedier delivery.

BIRD NOTES FROM MOLO 2. The Garden

By MRS. D. M. SHEPPARD, O.B.E.

(Article received in 1954)

In the golden glow of first light when all the world is hushed, waiting for the dawn, the silence is broken by 'chup, chup, chup, seee chup chup, seee chup—' followed by bursts of harsh metallic chattering. The Tacazze Sunbird, always early to rise and late to bed, has started on his rounds slitting the throats of my snapdragons and fuschias, and soon the sun will be turning his coat, near-black in the half light, into a shimmering mantle of purple, violet, rose, bronze and green. Of all the local sunbirds he is, perhaps, the most beautiful. Certainly he's the most aggressive, though chiefly towards his own species. Many a time, when grubbing in the garden, I have been nearly scalped by a pair of these 'jets' pursuing each other at incredible speed in a frenzy of love or hate.

When the 'Lions' Ears' are full of honey we are visited by the shining emerald Malachites, but they're shy birds and seldom seen in the garden. Double-collared Sunbirds are common throughout the year and the Variable Sunbird (what an unimaginative misnomer for a bird of such vivid hues!) are irregular visitors. Their specialities seem to be sweet-peas and the bush salvia with small carmine flowers. One October the garden was invaded for the first time by Golden-winged Sunbirds. There have always been large numbers of these handsome and very noisy sunbirds around the forest edges, especially when the *Crotellaria agitaflora* are in bloom, but never before have they become so domesticated, completely annexing the fuschias in front of the veranda to the exclusion even of the pugnacious Tacazzes. I found one of their nests this year (Jan. 25) quite near the house, in a clump of *Leonotis Elliotii* right beside a path and at head level—obvious for all to see. It was most beautifully woven of the finest grasses lined with plant-down and as I approached to peer in, a young bird, fully fledged, flew out.

Our veranda is a never-ending treasure trove for the sunbirds; a well-stocked larder and building store. Almost any day they can be seen insect-hunting among the cobwebs or under the bark of the off-cuts, insects, I'm convinced, forming as big a part of their diet as honey. Last March a pair of Tacazzes decided to build on a low branch of a big fir tree about 20 yards from the house and almost all the material came from the veranda. I have an Ethiopian fly-whisk hanging up, a horse's tail in an ivory handle, and this was a great find, as were a bunch of chickens' feathers which I misguidedly thought, when stuck into potatoes on the end of a string, would keep the birds away from my peas. The remains of these had got shoved away under a bit of loose bark and served a better purpose lining the sunbird's nest. Strips of bark were used and dead leaves and cobwebs and even the fluff out of the doormat, which was most carefully 'teased' on the spot before being carried off to the nest. And all the while the hen-bird so patiently collected the material to weave her intricate nest, her mate chivvied her around in a frenzy of impatience, hurling what sounded like vitriolic abuse at her.

Voices! strident, muted, musical, discordant! a multitude of voices. The screeching of the Red-headed Parrots as they fly over in the early mornings to the

olive trees; the wild shriek of the Crowned Hornbills flopping, ungainly, into the treetops and the rattling chatter of the White-headed Wood-Hoopoes scrambling up and down the tree-trunks in search of insects. The beautiful but melancholy cadence of the Coucal and the monotonous two-toned whistle of his diminutive cousin, Klaas' Cuckoo; the lovely liquid notes of the Black-headed Oriole, the clear bell-like duet of the Boubou Shrikes and the mournful wailing of the Fiscal Shrikes. The voice of the Olive Thrush, blackbird-like in range and quality and the conversation of the Robin-Chat, so aptly named; the thin whistle of the Cinnamon-chested Bee-eater as he flashes his gorgeous green mantle in the sunlight, the croaking of the Hartlaub's Louries up in the tree-tops and the derisive laughter of my enemies the Mousebirds. The cheerful songs of the Canaries and Seed-eaters, the grating feeding note of the White-breasted Tits and the melodious warbling of the Yellow Mountain Flycatcher. All these and many more are as much part of my garden as the trees and flowers; without them it would indeed be a poor empty thing. One of our most brilliant birds, the emerald green and white Klaas' Cuckoo, is heard far more often than seen; in fact we feel he should qualify for the nickname of 'brain fever bird,' so maddeningly monotonous is his song and so difficult is he to locate. I think he must be something of a ventriloquist.

On the 1st November last I had an S.O.S. from a near neighbour to come and identify a large and ugly baby being fed by sunbirds. I found not one, but two, young Klaas' Cuckoos being fed by Tacazzes within 20 yards of each other. They were almost fully-fledged, their mantles already showing a good deal of green, their white breasts strongly barred with grey. It is not often one has the good fortune to watch even one young cuckoo being fed within a few yards of one's house: it is surely unusual to see two.

There have been many red-letter days. The day I watched the mighty Eagle-Owl being mobbed by small birds in a tree by our garage and a few minutes later saw a Mountain Buzzard perched on a gum branch behind the stables, one foot on a large rat, also being mobbed by Tacazze Sunbirds. The day I first identified our Wryneck, often suspected but never before seen close enough to be certain, and the day last March when I first saw the beautiful little Black-crowned Waxbills—fairly frequent visitors since. And there was the unforgettable morning which the Paradise Flycatcher spent with us, his pure white tail streaming behind him like a chiffon scarf, yet never getting entangled, as he hawked so nimbly among the olive branches.

The visits of migrants, too, are always occasions to remember. Of local ones the most surprising were a pair of Namaqua Doves that spent a day with us last April. They, like the Fork-tailed Drongos, that we see occasionally, belong, I feel, to lower altitudes and warmer climes. In May we were visited by a large party of Rufous-backed Mannikins, never seen here before or since, and last February a number of chocolate-faced White-eyes stopped about a fortnight in the garden feeding among a flock of the common Green variety, which I have been unable to identify. (Note: these 'chocolate-faced' White-eyes were probably birds whose facial plumage was stained with pollen).

We had Harlequin Quail for supper once after a number of them had committed suicide on the veranda while we were out—dazzled no doubt by the lights.

Of European migrants I have only recorded two species in the garden apart from birds of prey—the Blackcap and the Willow Warbler, both singing on arrival in October. A cock and hen Blackcap were feeding together in December and I heard of a pair that wintered together in a garden at Kipkabus. Is it common, I wonder, for these birds to winter in pairs?

But the most exciting of all red-letter days was the day we had a hatch of flying ants in our wood and a great concourse assembled to gorge on the spoils. We stood on the lawn with the ants swarming round our heads and watched fascinated the following incredible varieties of birds, all hawking from one small olive tree. Boubou Shrike, Fiscal Shrike, Olive Thrush, Robin-Chat, Toppie, Pied Wagtail, Reichenow's Weaver, Klaas' Cuckoo, Slaty and Wattle-eyed Flycatchers, Golden winged and Tacazze Sunbird, White-breasted Tit, White-eye, Brown-headed Weaver and Chestnut-throated Apalis Warbler, Golden-rumped Tinker-Bird Yellow-crowned Canary, Streaky Seed-Eater, Glossy Starling, and Cardinal Woodpecker. The latter, in spite of his usual ungainly flight, proving the most agile of the lot, hardly ever scoring a miss. In the midst of this frenzied activity, just to add to the excitement, a pair of Augur Buzzards, one white and one melanistic, came swooping close over our heads scattering, temporarily, both hunters and hunted.

It is not often one has the good fortune to witness a sight such as this, but it is equally true to say that not often a day passes without some incident of interest: a new habit observed in an old acquaintance, a choice of food or tone of voice not previously noted. There is something fresh to learn daily for those that have eyes to see and ears to hear.

And even when darkness falls and we light the fire and draw the curtains and can no longer see, we can still listen to the special good-night notes of the late-to-bedders, the Sunbirds, Thrushes, Robins and Slaty Flycatchers, then later to the cry of the Nightjars, starting their day's work as others finish. Later too, if we're lucky, we'll be thrilled by the deep-throated 'hooo-cuk' followed by demoniacal barking of the king of the night—the Eagle-Owl.

'Drumming' by Swifts

Over a dam at Langata, ten miles from the centre of Nairobi, I have frequently seen parties of Mottled Swifts (*Apus aequatorialis* (Muller)); their visits appear to be primarily for the purpose of drinking from the surface of the dam.

On the 27th April 1958 I heard a loud 'prrrpt-prrrpt-prrrpt' repeated at frequent intervals while the swifts were present. My wife and I had them under observation with binoculars for about half-an-hour and discovered that this noise was being made by the birds spreading and depressing their tails and twisting them sideways (usually to the right) so that the outer feathers on that side projected into the slipstream. The 'leading' feathers were quite clearly seen to vibrate at the same time that the noise was heard. This phenomenon was not confined to a single bird, as many were seen to make it.

I can find no reference to such 'drumming' by a member of the swift family: it has been recorded for certain species of honey-guide and is, of course, a well-known habit of certain species of snipe.

D. K. Bednall.

ADDITIONS TO THE CHECKLIST OF TANGANYIKA MAMMALS

By

G. H. SWYNNERTON, F.Z.S., *Game Warden, Game
Preservation Department, Tanganyika*
and

R. W. HAYMAN, F.Z.S., *Senior Experimental Officer,
Department of Zoology, British Museum (Natural
History), London*

In 1951* we presented a list of the known forms of mammals recorded from Tanganyika and the Zanzibar Protectorate. In the intervening years the taxonomy of a number of the groups has been revised, many new records of occurrence have been made, and a few forms not formerly recorded from Tanganyika have been added to the list.

This paper is concerned only with recording the additional forms found in Tanganyika. The other changes will have to await a complete revision of the Checklist.

Family MACROSCOLIDIDAE Mivart.

PETRODROMUS SULTANI SCHWANNI Thomas & Wroughton, 1907.

1907. *Petrodromus schwanni* Thomas & Wroughton, *P.Z.S.* 1907:
289, 1 Aug. Coguno, Inhambane District, southern Portuguese East Africa.
Record. Lindi (coll. Ionides).

RHYNCHOCYON CIRNEI REICHARDI Reichenow, 1896.

1896. *Rhynchocyon Reichardi* Reichenow, *Zool. Anz.* 9: 316, 17 May. Marungu,
west of the centre of Lake Tanganyika, eastern Belgian Congo.

1902. *Rhynchocyon Reichardti* Thomas, *Ann. Mag. N.H.* (7) 10:

403, Nov. Mistake for *R. reichardi* Reichenow.
Record. Namwele, Ufipa District (coll. Vesey-Fitzgerald).

Family RHINOLOPIDAE Bell.

RHINOLOPHUS SIMULATOR K. Andersen, 1904.

1904. *Rhinolophus simulator* K. Andersen, *Ann. Mag. N.H.*
(7) 14: 384, Nov. Mazoe, Mashonaland, north-eastern Southern Rhodesia.
Record. Tosamaganga, Iringa District (Aellen, 1957, *Rev. suisse Zool.* 64: 197,
Jan.).

Family VESPERTILIONIDAE Gray.

PIPISTRELLUS PERMIXTUS Aellen, 1957.

1957. *Pipistrellus (Pipistrellus) permixtus* Aellen, *Rev. suisse Zool.* 64: 200, Jan. Dar es
Salaam, east coast of Tanganyika.
Record. Known only from the type-locality.

KERIVOULA ARGENTATA Tomes, 1861.

1861. *Kerivoula argentata* Tomes, *P.Z.S.* 1861: 32, May. Otjihoro, about 20 miles west
of Ondongwa, Ovamboland, South West Africa.
Records. Mkundi, Liwale District (coll. Ionides); Old Shinyanga (coll. Jackson).

*Swynnerton & Hayman, 1951, *J. E. Afr. N. H. Soc.* 20: 274.

Family LORISIDAE Gregory.

GALAGO DEMIDOVII THOMASI Elliot, 1907.

1907. *Galago (Hemigalago) Thomasi* Elliot, *Ann. Mag. N.H.*

(7) 20: 189, Sept. Fort Beni, Semliki River, Belgian Congo near the border with Uganda.

Record. Madehani. Based on a series taken by Loveridge in 1930 and wrongly identified as *G. senegalensis moholi* A. Smith by Allen & Loveridge (1933, p. 84; *fide* Lawrence & Washburn, 1936, *Occ. Pap. Boston Soc. N.H.* 8: 255, 8 Jan.). Madehani should be removed from the list of records given in the Checklist under *G. s. moholi* A. Sm.

Family SCIURIDAE Gray.

Genus **PROTOXERUS** Forsyth Major, 1893.

1893. *Protoxerus* Forsyth Major, *P.Z.S.* 1893: 189, 1 June.

Subgenus of *Xerus* Ehrenberg; type *Sciurus stangeri* Waterhouse (see Thomas, 1898, *P.Z.S.* 1897: 933).

PROTOXERUS STANGERI CENTRICOLA (Thomas, 1906).

1906. *Sciurus Stangeri centricola* Thomas, *Ann. Mag. N.H.* (7) 18: 295, Oct. Entebbe, north shore of Lake Victoria, Uganda.

Record. Kungwe Mt., east of Lake Tanganyika (coll. Cooper).

Family MURIDAE Gray.

DASYMYS INCOMTUS ALLENI Lawrence & Loveridge, 1953.

1953. *Dasymys helukus allenii* Lawrence & Loveridge, *Bull. Mus. comp. Zool.* 110: 53. Ilolo, Rungwe Mt., Rungwe District, south-western Tanganyika.

Records. Uzungwe, Ukinga, Rungwe and Poroto Mts., south-western Tanganyika (included under *D.i. helukus* Heller in the Checklist; coll. Loveridge).

Genus **ZELOTOMYS** Osgood, 1910.

1910. *Zelotomys* Osgood, *Field Mus. Publ. Zool.* 10: 7. Genotype *Mus hildegardae* Thomas, 1902.

ZELOTOMYS HILDEGARDEAE LILLYANA Bohmann, 1950.

1950. *Zelotomys hildegardae lillyana* Bohmann, *Zool. Anz.* 145, *Erganzumpb.* 1950: 68. Tembo Quelle, northern foothills of Kilimanjaro at 1,750 m., northern Tanganyika.

Record. Known only from the type locality.

OTOMYS UZUNGWENSIS Lawrence & Loveridge, 1953.

1953. *Otomys uzungwensis* Lawrence & Loveridge, *Bull. Mus. comp. Zool.* 110: 61. Dabaga, Iringa District, south-western Tanganyika.

Records. Dabaga, Kigogo (coll. Loveridge) (included under *O. percivali* Dollman in the Checklist; the latter species should be deleted from the list).

Family BOVIDAE Gray.

OUREBIA MASAKAENSIS Lönnberg & Gyldenstolpe, 1925.

1925. *Ourebia masakensis* Lönnberg & Gyldenstolpe, *Arkiv f. Zool.* 17B (9): 3, 14 May. Kyazanga, Masaka District, western Uganda.

1925. *Ourebia pitmani* Ruxton, *Ann. Mag. N.H.* (9) 18: 33, July. Near Lake Nakivale, Ankole District, south-western Uganda.

Record. Bukoba District north of the Kagera River (Pitman, *in litt.*).

THE RATEL

By J. D. L. FLEETWOOD, *Mammalogist, Coryndon Museum, Nairobi*

The following extract from a letter sent to the Coryndon Museum by T. Rawson-Shaw, of Songhor, describing the depredations and final destruction of a ratel, opens up a new field of investigation and it would be interesting to have readers' views and experiences on this subject. There is no reason why the ratel, a powerful carnivore, should not have a following of weaker species.

"For some weeks our poultry were being attacked almost nightly. During this reign of terror six strongly-built hutches (6" × 1" cedar timber) were broken into by pulling off a board from the wall, floor, or door, and twice a larger house was entered by digging under stone foundations.

"I guessed it must be a ratel, but imagined a whole family party, as the first raid accounted for seventeen large Muscovy ducks, almost completely consumed, and the second for thirty-six half-grown pullets—leaving only a few feathers. I started poisoning baits and the damage done got less and less and all the baits were taken, but the raids did not stop and I only picked up two civets. More civets and probably jackals and possibly ratels may have died of poison and were never found in the long grass and bush.

"Anyhow on the last two occasions the intruder broke in he only ate one duck and chopped the heads off a couple more, so he was probably alone by now. The final drama occurred a few nights ago.

"We set a wire snare in the hole just made the night before under stone foundations, and my Turkhana headboy kept watch. About 9 p.m. he reported that an animal had gone through the snare and was killing more ducks. Armed with a sharp panga and a .22 rifle, we entered the duck house and located something hiding in an upturned half-drum. I fired point-blank into the grass and out came an old male ratel. Blows from the panga which would have cut any other animal of that size in half merely bounced off, leaving a shallow gash on his hide, and it took about ten of these and four .22 bullets to kill it. I think now there may never have been more than one ratel, but that he had a following of civets and jackals.

"There have been no more raids since we killed him. How was it that he himself never took the poison?"

The RATEL or HONEY-BADGER.

Classification and Distribution:

Order: *Carnivora*
Family: *Mustelidae*
Genus: *Mellivora*
Species: (2).

- (1) *capensis*—confined to the Ethiopian Region of Africa.
- (2) *indicus*—outside Africa, eastwards to India.

Mellivora capensis has 10 sub-species of which four occur in the East African Area (including Abyssinia and Somaliland).

- (1) *Mellivora capensis abyssinica*.
- (2) " " *brockmani*.
- (3) " " *maxwelli*.
- (4) " " *sagulata*.

Origin

Fossil remains of the Pliocene period, obtained in India, suggest that India was their original home and that they migrated to Africa.

Skull and Dentition

Skull broad and massive with a well-developed occipital crest.

The teeth are large and powerful and less in number than other members of the family. There is no 1st premolar. The upper molar is small and has a characteristic dumb-bell shape, with the inner lobe wider. The lower molar is larger.

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3.	1.	3.	1.	

Description

A large adult may measure over three feet in length, including the short tail, with a shoulder height of about one foot. The build is best described as 'stocky', there is no suggestion of the lithe, sinuous movement of the other members of the family. This is amplified by the plantigrade, bear-like method of walking. Despite this seeming clumsiness, the ratel is an excellent climber and can move quickly in rough country. Powerful claws, especially on the fore-feet, enable it to burrow and tear open bee-hives. There are five toes on each foot.

Like its near relative the zorilla, the ratel has distinctive 'warning colouration'. The general colour is brown to black, with a conspicuous light-coloured mantle running back from the front of the head and covering the top half of the body. A paler stripe runs along the lower edge of the mantle, on either side. The short tail is coloured like the mantle at the top. The dorsal colour varies from grey to near-white, but is usually stained by contact with the earth.

The ratel has two methods of protection. There are anal glands producing a pungent odour, like the zorilla, but in a milder form; and a thick loosely fitting skin, like a sheet of tough rubber. This, coupled with the possession of extremely powerful jaws, makes the ratel a tough opponent for the strongest foe, consequently it has no enemies to fear, apart from man. Ratels have been known fearlessly to attack humans and there is a case on record of a buffalo bull being killed by one.

There are two pairs of mammae.

Feeding Habits

Being nocturnal, feeding takes place after dark, or occasionally in daylight on very dull days.

Although possessing the dentition of a carnivore like the other members of its family, it is really omnivorous and will eat small mammals, birds and their eggs, reptiles, insects, fruits, berries and other vegetable matter. It is especially partial to honey (hence its alternative name) and devours honey and larvae, oblivious of attacks from the bees, which are unable to penetrate the thick rubbery skin. The impenetrable skin also helps in its attacks on porcupines and snakes. Tortoises are included in its diet, their shells being easily broken by the powerful teeth. There have been recent cases of ratels raiding flocks of sheep.

Reproduction

Only two young are produced at a time normally, in a hole underground or in a rock crevice. There is some doubt about the period of gestation, but one authority puts it at six months.

The ratel is quite common but, like that other ubiquitous and successful carnivore, the leopard, it is seldom encountered.

THE RHINO AND THE LIONS

By W. M. TABERER, Warden, Amboseli National Park

The following interesting account will give some idea as to what extremes a lion will go when faced with hunger and man not being his natural food.

Some years ago a young rhino took up his abode at the waterholes in front of the Lodge bandas. When he first arrived he was with his mother, who a year later produced another calf. No doubt feeling a bit out of it now, he decided to stay around the camp, and not follow Mum and sister back into the covets after drinking. We christened him *Tukai*.

It did not take long before he was so accustomed to people and cars and the smells and noises of the camp, that he would remain on view all day out in front of the bandas, either lying in the wallow he had made at the nearer waterhole, or feeding up to the Warden's garden fence. In fact, he became the Lodge pet and show piece.

The Kania pride of lions frequently used these same waterholes, and it was quite common to see Tukai out in front lying under a tree surrounded by lions, some within fifteen feet of him and taking not the slightest notice of his presence, nor he the least concerned about their nearness. Vehicles and the public are normally kept out of the waterhole sanctuary, but I have taken the odd party in to photograph just such a scene.

Last November I returned after a long absence, and was delighted to see Tukai still around, and now about five years old he was weighing perhaps a ton and a half or more. I had also seen Kania and her bunch some distance from camp but looking in very poor condition.

A night or two after my return I was wakened by the most frightful wailing; thinking it was a hyena I tried to get off to sleep again, but the noise persisted and kept me awake. It seemed to come from the waterhole direction, so I decided to get up and drive out to investigate. Imagine my astonishment when I found Tukai had been set upon by the two males of Kania. They had got him down on his side, and one had hold of his throat while the other kept him there by lying across his ribs and was biting into his neck. He, poor chap, was squealing his heart out.

Hoping to keep our pet alive, I managed after a little trouble to drive the lions off, and was delighted to see Tukai get on his feet and show some fight. I backed away, and no sooner had I done so then one of the lions rushed in, reared up over the rhino, grabbed him across the back and pulled him down on to his side again, and with no apparent effort. Once he was down, the other lion tore in and grabbed Tukai under the shoulder and broke his leg at the joint. I realised then that he was done for, and that it was going to be a long and noisy job before they finally finished him off, as he was still screaming his head off.

I tore back to the house and woke up the Assistant Warden, David Lovatt Smith, and drove him back to the scene with a rifle. After driving the lions off a second time, I managed to manoeuvre so that he got in a good shot, and put poor old Tukai out of his misery. In the morning we went out to the scene of battle, and found the entire pride feeding on the carcass.

The amazing strength of a lion will always remain unchallenged, but for a single lion to be able to pull an almost fully grown rhino over on to its side, and without undue effort will, having witnessed it, always remain to me quite incredible.

At the time of this battle, there was very little game in the area, but some Masai herds were still using the swamps, yet the lions chose the more formidable task of tackling a rhino whose whereabouts they knew rather than the comparatively easy one of taking an ox or cow. Possibly their inherent fear of a show-down with the Masai was the influence behind their decision.

I would like to end this little account by mentioning that Tukai was the rhino browsing outside the Warden's house when Her Royal Highness The Princess Margaret arrived in October 1956 to visit Amboseli.

NATURE NOTES

Bite of Burrowing Viper (*Atractaspis*)

In early April I had the misfortune to be bitten by a Black Burrowing Viper (*Atractaspis*) 17 inches in length. The site of the bite was the tip of the thumb, one fang being driven fully in. An improvised tourniquet was applied. Immediate reactions were a smarting sensation and slight bleeding. 10 c.c. of Fritsimons Polyvalent serum was injected in the arm 1½ hours after the bite and another 10 c.c. three hours later. By this time the site of the bite was discoloured, the thumb and back of the hand was swollen.

Some six hours after the bite there was a slight spell of giddiness, nausea, cold sweat and inability to focus the eyes; all of which passed off after a few minutes. Recovery was uneventful, although the thumb was painful for several days. Despite penicillin injections the bite became septic and took about a month to heal completely, yet even now, four months later, there is still recurrent sloughing of skin. I think this indicates virulence of the poison and although never previously having come across a case of poisoning from this snake, I know the natives in the Sudan and the Wanyamwezi in Tanganyika hold the bite to be fatal.

Snake's Climbing Abilities

I recently came across a Spotted Bush Snake (*Philothamnus Semivariegata*), three feet in length, climbing up the corner of a vertical cement wall. It was captured when six feet above ground-level but I am sure it would otherwise have easily reached the top. I have not previously seen or heard of a snake climbing a comparatively smooth, vertical wall and I should be interested to hear of any other cases.

C. J. P. Ionides.

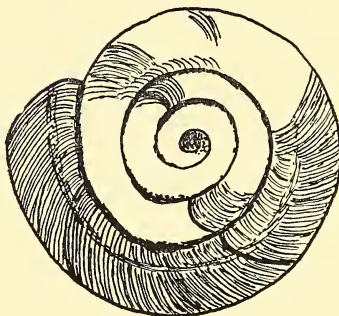
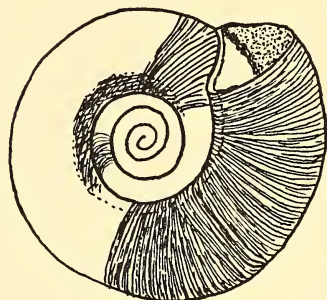
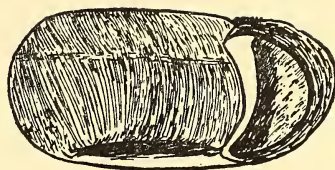
A Mystery Shell from the Kenya Coast

About five or six years ago Dr. Teesdale of the Division of Insect-Borne Diseases, Kenya, forwarded a single small shell to me which was probably collected at Malindi in a well, but the exact provenance is not known. This shell has proved to be exceptionally interesting, so this note has been written in the hope that someone will be able to turn up more material. It is needed alive.

From its outward appearance I immediately referred it to the Planorbidae and noted the close resemblance to the European *Bathypomphalus contortus* (L.). When adult the latter is much bigger, but juveniles bear a very close resemblance indeed. Dr. Hubendick of the Natural History Museum, Stockholm, who is well acquainted with the Basommatophora agrees with my diagnosis. Dr. Bequaert of the Museum of Comparative Zoology, Harvard, and Dr. Mandahl Barth of the Danmarks Akvarium, Copenhagen, have both examined the specimen and pronounced it to be an Endodontid land shell! It is difficult to pass judgement on a rather worn solitary specimen, and until more material is available no certain identification will be possible. I give three drawings to allow this minute shell to be identified. The specimen is in the collection of Dr. L. A. W. C. Venmans of Moergestel, Netherlands. (under No. 7869).

There are several genera of Endodontidae known with planorbid-like shells, e.g. *Afrodonta* which has lamellae in the aperture. The mystery shell does not seem referable to any of these genera, although I would not categorically state that it was not an Endodontid, particularly in view of the opinions of two such eminent mollusca experts who think it is!

B. Verdcourt.



1 mm.

Unidentified Planorbid from the Kenya Coastal Province.

Wild Life seen above forest line on Mt. Kenya, 26th-28th February, 1958

ALTITUDE 10,000-12,000 FEET. Moorland, mainly giant heath. Two bull buffalo were seen feeding among the giant heath. Two pairs of Shelley's Francolin (*Francoelinus shelleyi*) flew from the road into the giant heath. It is very difficult to flush them. They are a bit smaller and more brown-red than Jackson's Francolin which were also seen on the edge of the forest. Alpine Swifts (*Apus alpinus*) were nesting in cliffs at 12,000 feet plus.

Tracks of elephant were seen at 12,000 feet and they appeared to be crossing the eastern slope of Mount Kenya from Sirimon to above Embu.

ALTITUDE 12,000–13,500 FEET. Giant Groundsels and Lobelias. As we descended a ridge about 13,500–14,000 feet into Mackinder's Valley a pair of Lammergeyer (*Gypaetus barbatus*) flew over our heads, within gunshot! We had no difficulty in identifying them, we noticed the white head, red eye and the wedge-shaped tail. After circling over our heads, the birds soared aloft like jet planes on upward currents. They are magnificent aviators.

In Mackinder's Valley the most noticeable birds were the Kenya Mountain Chat (*Pinarochroa s. sordida*) and the Scarlet tufted Malachite Sunbird (*Nectarina johnstoni*). These birds which flew to and fro between the giant groundsels and lobelias were unbelievably tame. I also noted Hunter's Cisticola, a small dark bird with a fan-like tail. Large flocks of Slender Billed Starlings (*Onychognathus tenuirostris*) flew up and down the valley, often diving over our camp with a loud swish. In flight their chesnut coloured wings are most conspicuous. A brown Mountain Buzzard (*Buteo oreophilus*) flew over us on one occasion.

Seen in this valley were two Mountain Bush Duiker (*Altivalis*). This is the ordinary bush duiker but with rather longer fur than the bush duiker of lower altitudes. A carcass of one was found—probably killed by a leopard. The spoor of a female and a small leopard were seen up to 14,500 feet. They probably feed on the hyrax as well as the duikers. Buffalo spoor was also seen in the Mackinder Valley well over 13,000 feet. On a cliff we found the perching place of what was probably Mackinder's Owl (*Bubo capensis mackinderi*), judging by the large quantity of droppings beneath, which mainly consisted of rodents', which abound in the valley. Mackinder's Valley is one of the most interesting areas of the mountain, full of interesting mammals, birds and plants. Mrs. Hale made a collection of some of the latter which were taken to Mr. P. R. O. Bally for identification.

ALTITUDE 13,500–15,500 FEET. Snow lay frozen at about 14,800 feet. Mostly bare rock with few Senecio Daisies and moss. The hyrax found on the mountain is apparently a special species—Mackinder's. He appears to be larger than the ordinary rock hyrax and more brown in colour. Several carcasses were found nearly intact and it was not apparent what had killed them. We saw these hyrax at over 15,000 feet and it was not obvious what they feed on, for at 15,000 feet and upwards the only vegetation was moss and even that was dried up. They are probably the main item of the diet of the leopard that frequents these high altitudes, for leopard spoor was seen well above 14,500 feet. We saw no birds of the family *Corvidae*. The bird that appeared to reach the highest altitude was a pair of Augur Buzzards (*Buteo rufofuscus*). These birds were wheeling round Sendeyo Peak and I saw one settle on a ledge which cannot be less than 16,000 feet up.

W. H. Hale, Chief Game Warden.

Heller's Thrush on Kilimanjaro

In company with E. K. Cowen of Mombasa, I saw a Heller's Thrush, or 'Teita Thrush' (*Turdus helleri* (Mearns)) at Kibo on the lower slopes of Kilimanjaro (about 6,500 feet) on the late afternoon of the 20th February 1956.

We watched the bird for about three minutes during which time it was never more than twelve yards away. The bird flew down to a patch of vegetables from a banana tree and pecked the ground in typical thrush fashion. Its head all round and upper parts, including the tail, were a very dark blackish-brown (darkest on the head) graduating into dark greyish-brown on the chest; the belly was a dirty white with flanks bright orange though little of the orange could be seen. The bill was a deep orange and a narrow ring of bare skin round the eye was bright orange.

I had not seen this species before but have handled the skins in the Coryndon Museum.

Mackworth-Praed and Grant (1955) limit the range of Heller's Thrush to the Teita Hills some sixty miles to the east of Kilimanjaro.

D. K. Bednall.

Battle between Rhino

I am pleased to furnish details of the rhino incident when two of these uncertain beasts fought until both combatants flopped heavily on the ground—their vigour spent. It happened thus.

I arrived at our hotel site, better known as 'Hunter's Lodge', where bush and weed clearance was in progress. The time was about 8.30 a.m. To my surprise I saw the labour gang running in the direction of the African labour hutments. I followed. To my intense surprise I realised two rhino bulls were engaged in enraged combat. Soon quite a gathering of Africans were absorbed watching a struggle they had not apparently previously, witnessed. The scene lasted for more than an hour and seemed to fluctuate by the pressure exerted by either rhino. Eventually both participants, seemingly worn out by the struggle, flopped heavily on the upturned earth—their vigour spent.

During the melee excited Africans clapped their hands in glee as the great beasts scored in attack, usually smothered in a column of red dust. It was indeed a 'battle royal', as if staged for their special benefit. In attack the rhinos' shoulders seemed to take the brunt of the resounding thuds which could have been mistaken for sounds emitted by elephants.

Tired out, the two bulls lay on their sides and a few hours later went their respective ways.

Visiting the scene of battle, I expected to find lots of blood, the penalty of encounter, but found little in the churned up earth.

I am vague as to the cause of the conflict, but I somehow surmise each claimed right of way to use certain game trails and browse on the verdant and succulent undergrowth.

J. A. Hunter,
Honorary Game Warden, Makindu.

ACTIVITIES OF THE SOCIETY IN NAIROBI, 1957

By PRISCILLA M. ALLEN

It is thought that members in places other than Nairobi may like to know how we in Kenya's capital have been disporting ourselves. About half our members live in or near Nairobi, but it is the publication of the Journal, always one of our major activities since the beginning of the Society, which gives us a larger than merely local interest and is also the main drain upon our funds.

The past year has been a very active one here. Members will have learnt from the Newsletter that rambles were held each month, and last year we had the assistance of Mr. S. J. K. Collins, who explored and showed us a number of new places in the Machakos area, the Mau Hills and the piece of country between Eastleigh and Komo Rock. One expedition that stands out in my memory was to the Tana River at the Embu Road crossing and the Mwea Rice Scheme. Nightingales were singing in the bush along the Tana and the Mwea irrigated area was swarming with birds.

Mr. Collins also organised several week-end camps, of which perhaps the most noteworthy was from Empire Day over the following week-end at Elementeita (by kind permission of Lady Eleanor Cole). Nesting was in full swing, and besides the activities of the Flamingoes, which were being studied by a senior member whom the camping party feared to disturb, nests were found of Kitlitz Plover, Red-capped Lark and many others. A pair of Batis were watched pluckily attacking an Oriole, and it was interesting, too, to note that the Little Rock Thrush seemed to have been breeding there.

The most important event in the year for those interested in birds was the Pan-African Congress of Ornithology at Livingstone, which brought many transit visitors. We managed to catch Mr. Roger Peterson, now so well-known to us as the illustrator of the *Field Guide to the Birds of Britain and Europe* and to persuade him to give the Society a talk on various curiosities of bird life observed during his long experience. The meeting was held in the pleasant setting of Mrs. Fleming's house, where we had tea and a chance of chatting with Mr. Peterson and meeting other friends.

For those privileged to take part in them there were also delightful private occasions; a drive in the National Park with Miss Ferrier of Cley, with the lions behaving really nicely; an early morning walk by the Athi with Mr. Cohen of the British Trust for Ornithology, when we listened to Grey Hornbills, Guinea-fowl and Kingfishers and the Cossyphas imitating them; and an all too brief glimpse of the Herberts of Liston Front Range Lighthouse.

Visitors later in the year included Dr. R. C. Murphy, the world-famous authority on sea-birds, who gave us a most enthralling talk on the Bird Life of the Peruvian Guano Islands illustrated with wonderful colour slides. This lecture, which was certainly one of the highlights of the year, described an interesting example of the preservation of natural resources in the interests of all concerned. Mr. and Mrs. Bowles provided the meeting place, with tea in their garden and all arrangements for the lecture were beautifully made in their house.

Still more recently some of us were privileged to meet Mr. and Mrs. Chapin and Lord and Lady William Percy.

Talks and film shows given in members' houses have been a feature of our activities recently. The series was started the year before when Dr. Greenway gave a party at his house for members to meet Mr. Milne Redhead and Mr. Peter Taylor, both of Kew. These parties entail much less work and anxiety for Committee than a formal lecture, all the work being thrown on to one person (or two people) each time, and though we make a point of having a collection to cover the cost of the food, this does not begin to pay for the time and trouble taken by our hosts and hostesses in making these parties the success they have undoubtedly been. Neither can we have distinguished visitors every month, and local talent has also provided parties—at Dr. V. R. Patel's house, where besides the lovely rose garden, we saw excellent films of the Uganda National Parks, and at Mr. North's, where we listened to records of bird songs.

In this connection I might mention the meeting held under the humble and leaky roof of the Vice-President (luckily it was not raining at the time), at which the Society exercised its right to put forward the names of two people to sit on the Museum Board of Trustees. Mr. W. H. Hale and Mr. R. W. Rayner were chosen at this meeting in the places of Mr. H. Copley and Mr. Gedye, both now retired. (Mr. Hale is Game Warden and former President of the Society. Mr. Rayner is President at the time of writing). The austerity of this meeting was lightened by a showing of some very interesting colour transparencies by Mr. Collins.

I seem to have said more about bird study than about anything else. It has been in the ascendent during the past year, partly, no doubt, owing to the Congress, but mainly because of the presence of some members who combine learning with public spirit and of a fairly reliable body of followers. The botanical rambles almost came to an end at one point in spite of the President's efforts. They seem to be reviving again now, but are in need of a stiffening of keen people who are prepared to do some work. Beginners are always welcome, but it gets boring for the leader to have to show you *Achyranthes aspera* every time.

Those interested in geology have mostly forked out the extra 10/- to join the new Geographical Society (whose President is also a member of our Society), which has been organising first-class expeditions much enjoyed by those of us who belong to both. However, now that we hope to have a geologist on the Committee we shall have to do some more work in that line ourselves.

BOOK REVIEW

Flora of Tropical East Africa. Orobanchaceae

By DR. P. J. GREENWAY

Published under the authority of the Secretary of State for the Colonies by the Crown Agents for Overseas Governments and Administrations, 4 Millbank, London, S.W.1. Price Sh. 1/6.

A further part of this Flora has now been published, a parasitic family containing the 'Broomrapes'. It consists of seven pages with one full page plate and two genera are represented *Cistanche* and *Orobanche*.

The first looks like a giant 'broomrape' with bright yellow flowers. This is found in dry country, especially on saline soils and is often met with on the margins of the Nairobi—Magadi road below the scarp, just before and after the rains.

The second, *Orobanche*, contains three species, the most common the English broomrape *O. minor* Smith, with a dirty yellow or purplish flower spike up to 2ft. tall, should be known to all gardeners throughout East Africa, as it is found from 4,700ft. upwards, appearing most suddenly after heavy showers among one's flower beds, especially among annual flowers such as petunias, African marigolds, tobacco, etc. etc. The other two species in this genus are less common, both of them so far only known from Kenya and Tanganyika.

The Flora commences with a full description of the family, then a key to the two genera which should enable one to distinguish one from the other.

In *Cistanche* there is only the one species, *C. tubulosa*, so no key is needed for this, but a full description of the plant is provided along with its distribution in Kenya and Tanganyika in which collectors' specimens are quoted, as well as its geographical distribution in other parts of the world, by which we learn that it is found along the southern Mediterranean coastal areas from Morocco to Egypt, eastwards to Socotra and India, and southwards through Ethiopia to Tanganyika. It is also recorded in Senegal.

Orobanche is treated similarly, but as there is more than one species in this genus a key is provided for the three that are found in East Africa.

The plate consists of line drawings by Mrs. Milne-Redhead, of which there are six, five of them illustrating the full habit of *Orobanche*. Unfortunately there is only one flower drawing for *Cistanche* and that does not show very much.

These plants are parasitic, that is they contain no green colouring matter, chlorophyll, in their stems nor do they have leaves, so they are dependent for their sustenance to carry out their life cycle on what they can obtain from the roots of green plants. We have still to learn more about the host plants of these two genera. It is recorded that *Cistanche* grows on the roots of *Acacia*, *Pemphis*, *Commiphora*, *Suaeda*, *Atriplex*, *Tamarix* and *Salsola*, all trees and shrubs; whilst *Orobanche* does not seem to be very selective, being found on a great number of annual plants such as Legumes, Compositae and Solanaceae.

The author, R. A. Graham, a Colonial Office botanist, and Mrs. Milne-Redhead, the artist, both working at the Royal Botanic Gardens, Kew, are to be congratulated on their work in the production of this part of the Flora which can be bought for the sum of Sh. 1/6 from any Government Printer in East Africa, the Uganda Bookshop, Kampala, Uganda, or the Crown Agents in London.

The following parts of this Flora have been published:—Alangiaceae (Sh. 1/-); Canellaceae (Sh. 1/-); Caryophyllaceae (Sh. 3/-); Chenopodiaceae (Sh. 2/-); Connaraceae (Sh. 3/-); Gymnospermae (Sh. 2/-); Hypericaceae (Sh. 1/8); Marantaceae (Sh. 1/3); Menispermaceae (Sh. 3/-); Oleaceae (Sh. 2/9); Onagraceae (Sh. 2/-); Orobanchaceae (Sh. 1/6); Pedaliaceae (Sh. 1/10); Polygonaceae (Sh. 3/-); Ranunculaceae (Sh. 3/-); Rhizophoraceae (Sh. 2/6); Trapaceae (8d.); Turneraceae (Sh. 1/6); besides a Foreword and Preface as well as a Glossary of Botanical Terms (9d.).

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